



NJ Department of Environmental Protection Water Monitoring and Standards

Sanitary Survey Report of Shellfish Growing Area SE1 (Great Bay-Mullica River)



December 2017

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New Jersey Department of Environmental Protection (NJDEP)

Bureau of Marine Water Monitoring
Robert Schuster, Bureau Chief

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Report Prepared by:
Lisa DiElmo

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Cover Photo by Lisa DiElmo

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EXECUTIVE SUMMARY

Shellfish Growing Area SE1 is located in southern New Jersey's Atlantic Coastal Plain between Atlantic and Ocean Counties. It is situated within the Mullica River-Great Bay Estuary Complex, which encompasses Great Bay and the entire Mullica River, from its headwater streams to its connection with the Atlantic Ocean through Little Egg Inlet. This shellfish growing area is a small portion within the Mullica River-Great Bay Estuary Complex. The approximate size of this growing area is about eighteen thousand acres and includes two major waterbodies: Great Bay and the Mullica River. Shellfish water classifications for this growing area include *Approved*, *Conditionally Approved*, *Restricted* and *Prohibited*. Approximately seventy-three percent of shellfish waters are open for harvest year-round. However, there are still approximately twenty-four percent of shellfish waters that are either condemned or require a special permit for the harvesting of shellfish. Areas that require a special permit include the Mullica River and its surrounding tributaries. These areas are limited to the harvesting of shellfish due to poor water quality.

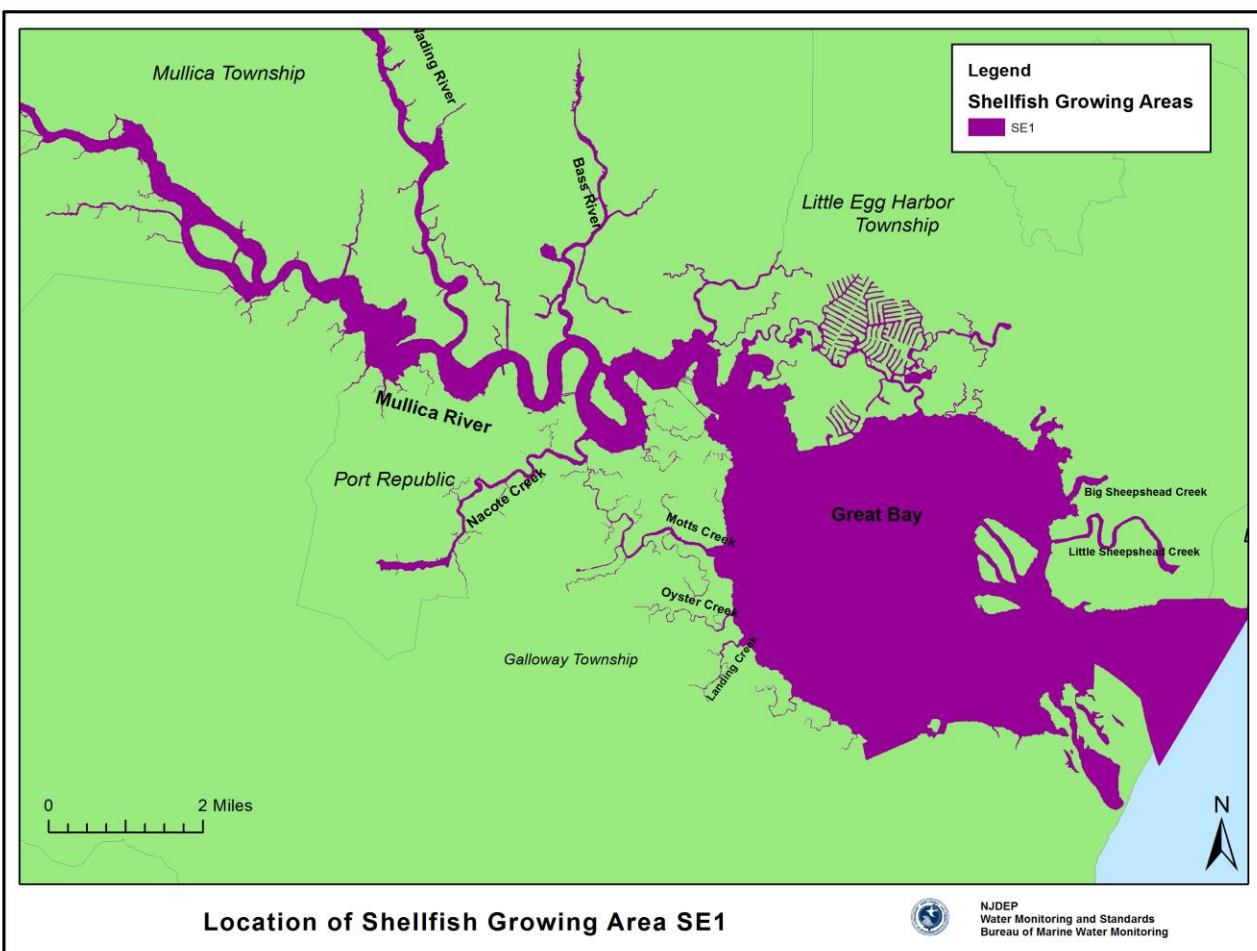
This report assesses data collected between October 2013 and August 2017. Approximately 2,604 water samples were analyzed for fecal coliform bacteria from 80 monitoring stations. Based on the bacteriological data, one monitoring station (1904) within this growing area does not meet its current *Approved* shellfish classification. At this station, there is a definite rainfall influence. The overall water quality for this growing area remains consistently good. There were no noticeable changes in shoreline, hydrography or land use that would require modification to the existing shellfish classifications. Since the elevated bacteria counts occur so seldom and likely don't remain elevated for extended periods, no downgrade of waters is recommended at this time.

GROWING AREA PROFILE

Location and Description

Shellfish Growing Area SE1 is located in southern New Jersey's Atlantic Coastal Plain. This area is approximately 10 miles from Atlantic City and 87 miles south of New York City. This growing area borders three counties, Ocean County to the north, Burlington County to the northwest and Atlantic County to the south. The following municipalities are adjacent to this growing area: Galloway Township, Port Republic City, Egg Harbor City and Little Egg Harbor Township.

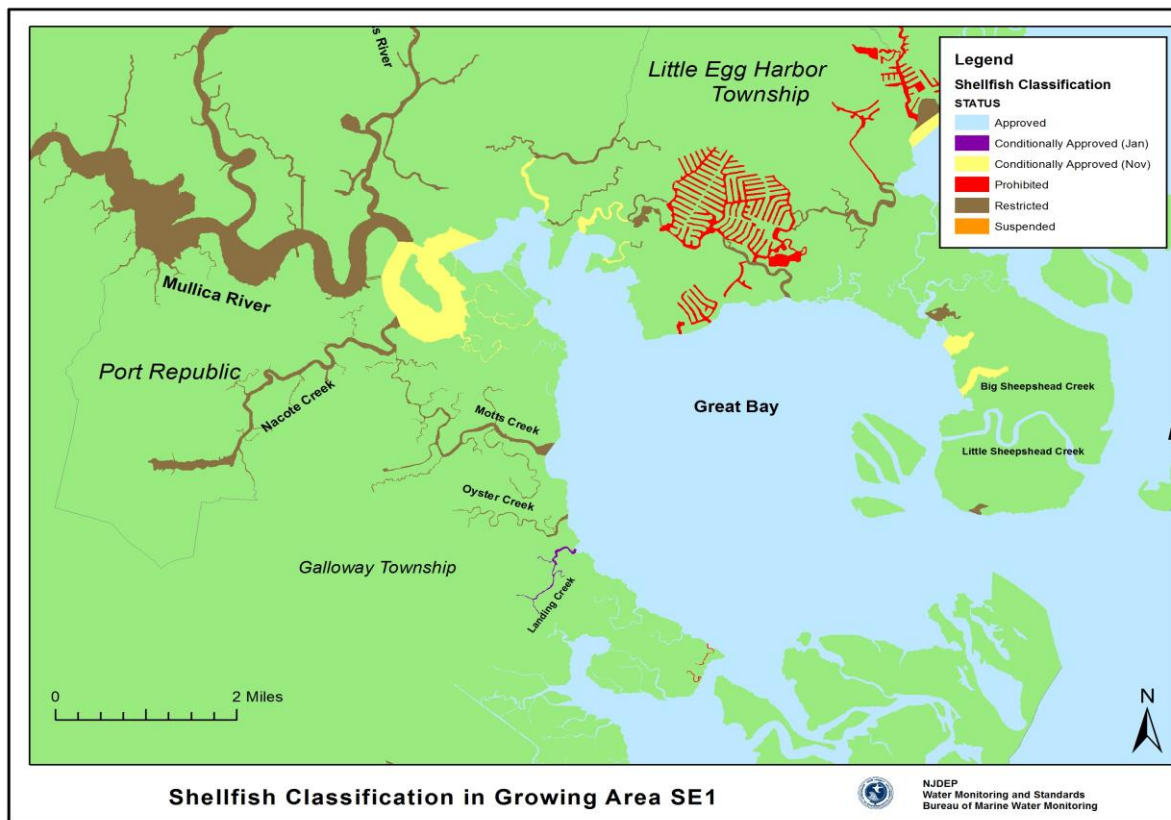
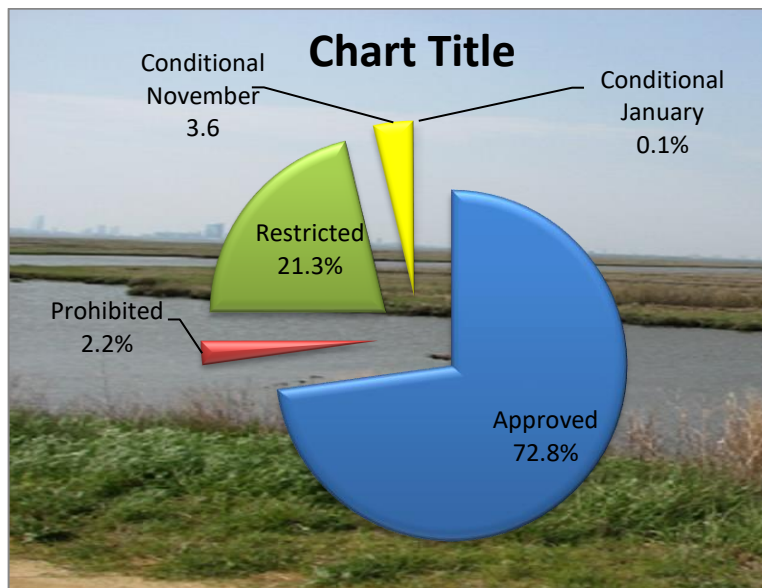
The approximate size of this shellfish growing area is about eighteen thousand acres. This growing area is also part of the Mullica River-Great Bay Estuary Complex. This complex encompasses the entire Mullica River, Great Bay and the tidal river from its headwater streams to its connection with the Atlantic Ocean through Little Egg Inlet. This shellfish growing area includes the following waterbodies: Great Bay, Mullica River, Judies Creek, Roundabout Creek, Ballanger Creek, Big Graveling Creek, Nacote Creek, Bass River, Wading River, Big and Little Sheepshead Creek, Jimmies Creek, Little Thorofare, Motts Creek, Oyster Creek, Landing Creek and many small tributaries along Great Bay.



Growing Area Classification Summary

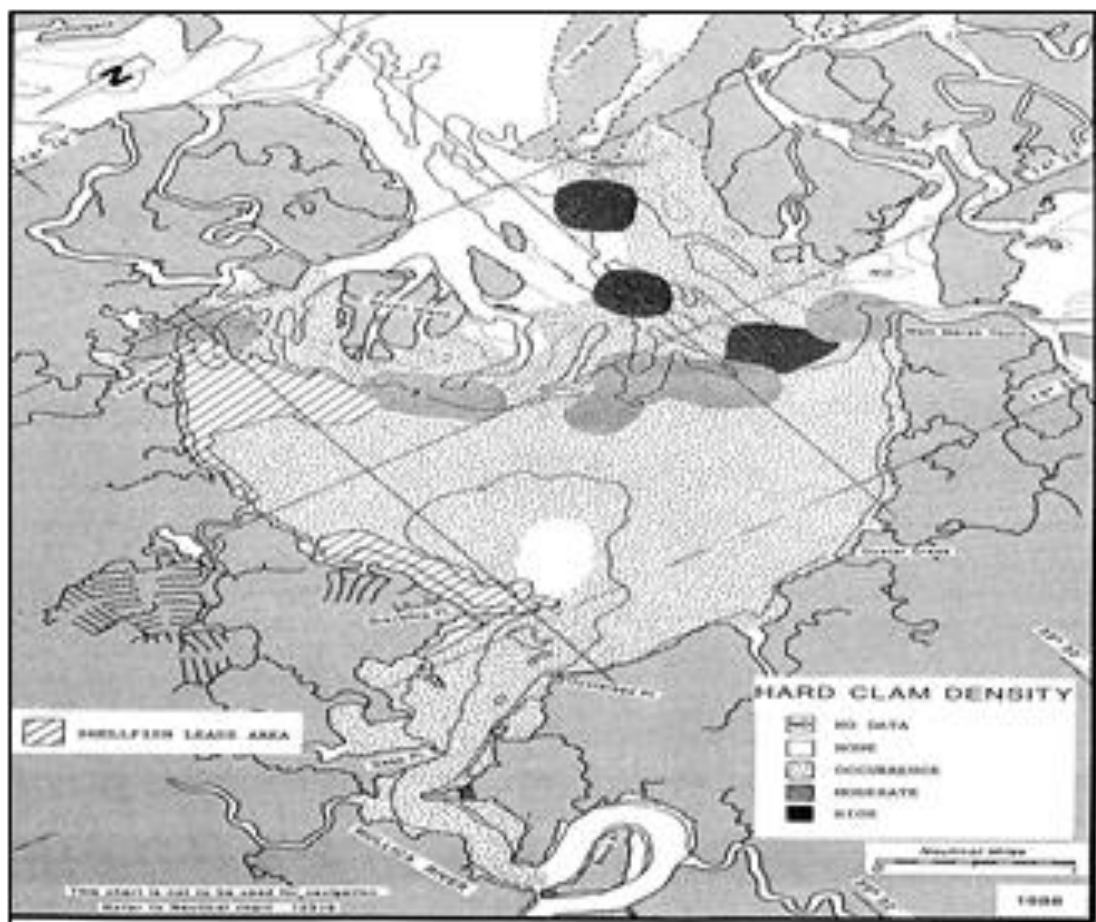
The overall water quality for this growing area is good with approximately seventy-three percent of shellfish waters open for year-round harvesting. However, there are still roughly twenty-four percent of shellfish waters that are either condemned or require a special permit for the harvesting of shellfish. Areas that require a special permit include the Mullica River and its surrounding tributaries. These areas are limited to the harvesting of shellfish due to poor water quality.

The figure below illustrates the shellfish classifications for this growing area. It can also be found on the 2016 State of New Jersey Shellfish Growing Water Classification Charts # 10 and 11 or on WM&S/BMWM website at <http://www.state.nj.us/dep/bmw/>.



Evaluation of Biological Resources

The Mullica River-Great Bay estuary has an abundance of biological resources, which were documented in the 1970s study conducted by the NJDEP, Division of Fish & Wildlife. The report stated that there were an abundant of bay anchovy (*Anchoa mitchilli*) and Atlantic silverside (*Menidia menidia*). Other species that were mentioned in this report included silver perch (*Bairdiella chrysoura*), alewife (*Alosa pseudoharengus*), striped killifish (*Fundulus majalis*), sea herring (*Clupea harengus*), white perch (*Morone americana*), northern puffer (*Sphoeroides maculatus*), oyster toadfish (*Opsanus tau*), and striped anchovy (*Anchoa hepsetus*). The bay also provides a good nesting ground



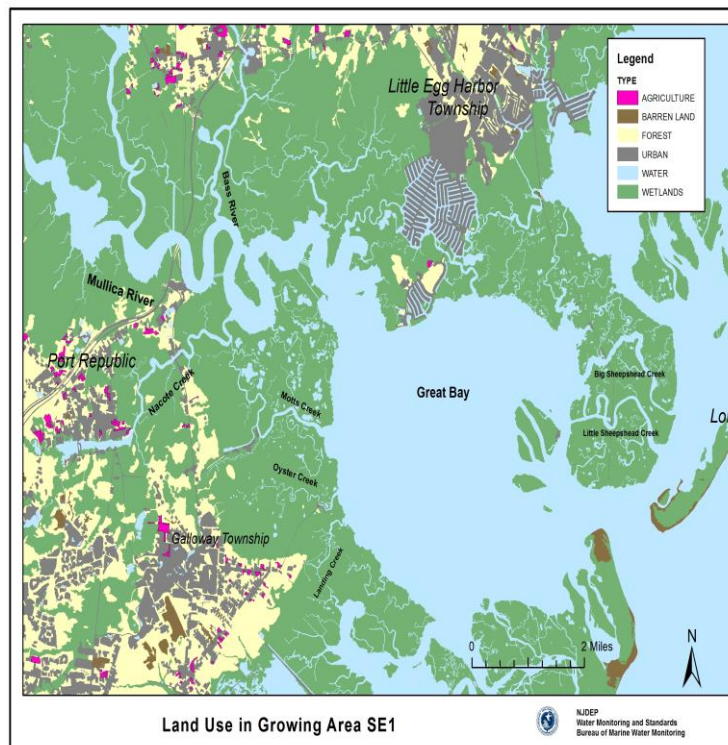
for blue crab. Commercial fisheries activities in this area include the harvesting of northern quahog (*Mercenaria mercenaria*) and blue crab (*Callinectes sapidus*). A shellfish resource map produced in 1988 by NJDEP, Division of Fish & Wildlife indicated the presence of hard clams throughout Great Bay. In some areas of the bay, there were moderate to high density of hard clams. A survey of hard clam and oyster density is currently being conducted by NJDEP, Division of Fish & Wildlife.

Shoreline Survey: Evaluation of Potential Pollution Sources

Shoreline surveys or site-specific tours of areas nearby or abutting shellfish growing waters can provide insight as to the location and nature of land use, surface water discharges, marinas, unpermitted discharges and stormwater inputs. Shoreline surveys of SE1 were conducted in 2017 and can be found in Appendix B. The following sections detail information derived collectively from the survey.

Land Use

The surrounding landscape has not changed significantly since the last shoreline survey. Wetlands still dominate the surrounding area. Most of these wetlands are Pineland Management areas, wildlife management areas and state forests. NJDEP, Division of Fish & Wildlife manages two wildlife management areas (WMA): Great Bay Boulevard WMA and Port Republic WMA. The surrounding wetland and marshes provide a suitable environment for nesting and foraging and support a diversity of aquatic and bird species. Osprey (endangered species) nesting platforms are found throughout this area. The shellfish waters are enclosed within these wetlands, which act as a barrier from the surrounding population centers. The wetlands utilize the nutrients obtained for plant growth and act as a purifier against pollutants. By doing so, these wetlands help to reduce pollutants entering into the shellfish waters.

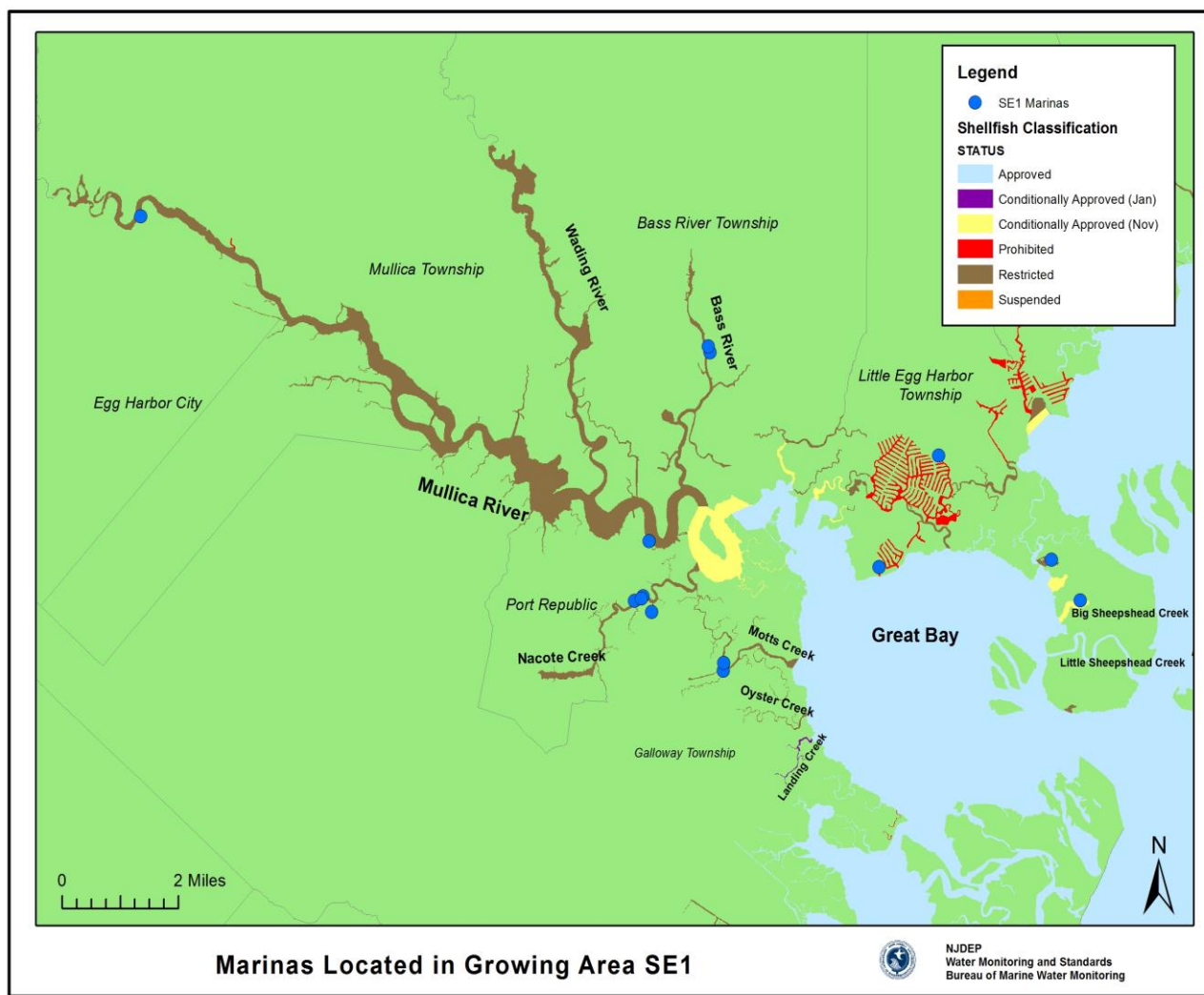


Surface Water Discharges

A surface water discharge involves the release of treated effluent from various municipal and industrial facilities directly into a river, stream or the ocean. The discharge of pollutants from a point source is authorized under New Jersey Pollutant Discharge Elimination System (NJPDDES), and the regulations are found at N.J.A.C. 7:14A. The main purpose of the NJPDDES program is to ensure proper treatment and discharge of wastewater. By doing so, the permit limits the amount or concentration of pollutants that can be discharged into ground water, streams, rivers and the ocean. According to the NJPDDES program, there are no surface dischargers found in this shellfish growing area at this time.

Marinas

The discharge of sewage from vessels into the waterways can contribute to the degradation of the marine environment by introducing disease-causing microorganisms (pathogens), such as bacteria, protozoan and viruses into the marine environment. Chemical compounds, such as oil and gasoline resulting from spills, leaks and pressure washing from vessels can poison fish and other marine organisms. Research has shown that by-products from the biological breakdown of petroleum products can harm fish and wildlife and pose threats to human health if ingested. (Klein, 2009) For this reason, waters within the marina basin are restricted to shellfish harvesting. Depending on the size of the marina, the water quality, flushing rates and the depth of the water, shellfish waters immediately adjacent to each marina, known as the buffer zone, may be classified as *Prohibited*, *Restricted* or *Conditionally Approved* (no harvest during summer months when the marina is normally active). The waters enclosed by the marina, (the marina basin) are classified as Prohibited. Marina buffers are calculated using the NJ Marina Buffer Equation. For additional information on the marina buffer equation, see the Shellfish Growing Area Report Guidance Document 2011. There are fourteen marinas situated within this shellfish growing area.



Marina Name	Address	Municipality	County	# of Boat Slips	Dates of Operation	Facility Services
Motts Creek Inn	200 E. Motts Creek Rd.	Galloway	Atlantic	11	Seasonal	Restrooms, Restaurant, Fish Cleaning Table, Boat Ramp
Maxwell Shellfish	22 Wilson Ave	Port Republic	Atlantic	15	Year Round	N/A
Great Bay Marina	45 Montana Dr.	Little Egg Harbor	Ocean	107	Seasonal	Fuel, Maintenance, Restrooms, Restaurant, Fish Cleaning Table, Boat Lift, Boat Ramp
Munros Marina	124 E. Anchor St.	Little Egg Harbor	Ocean	29	Seasonal	N/A
Captain Mikes Marina	630 Great Bay Blvd.	Little Egg Harbor	Ocean	62	Seasonal	Fuel, Restrooms, Fish Cleaning Table, Boat Ramp
Cape Horn Marina	570 Great Bay Blvd.	Little Egg Harbor	Ocean	100	Seasonal	Fuel, Maintenance, Restrooms, Fish Cleaning Table, Boat Ramp
Chestnut Neck Boat Yard	758 Old New York Rd.	Port Republic	Atlantic	40	Seasonal	Fuel, Restrooms, Restaurant, Fish Cleaning Table, Boat Lift, Boat Ramp, Maintenance
Viking Yacht Center	5724 Rt 9	New Gretna	Burlington	250	Seasonal	Fuel, Maintenance, Pump Out, Restrooms, Restaurant, Fish Cleaning Table, Boat Lift
Allens Dock	5698 Rt 9	New Gretna	Burlington	68	Seasonal	Fuel, Maintenance, Restrooms, Fish Cleaning Table, Boat Lift
Nacote Creek Marina	1 New York Rd.	Port Republic	Atlantic	60	Seasonal	Maintenance, Restrooms, Fish Cleaning Table, Boat Ramp
Sweetwater Marina and River Deck	2780 7 th Ave.	Mullica Twp.	Atlantic	89	Seasonal	Fuel, Restrooms, Restaurant, Boat Ramp
Unknown 1	Lindbergh Ave.	Port Republic	Atlantic	16	Seasonal	N/A
Unknown 2	E. Motts Creek Rd.	Galloway	Atlantic	12	Seasonal	Fish Cleaning Table
Fish Game and Wildlife	PO Box 418	Galloway	Atlantic	6	Year Round	N/A

Spills, Unpermitted Discharges and Closure

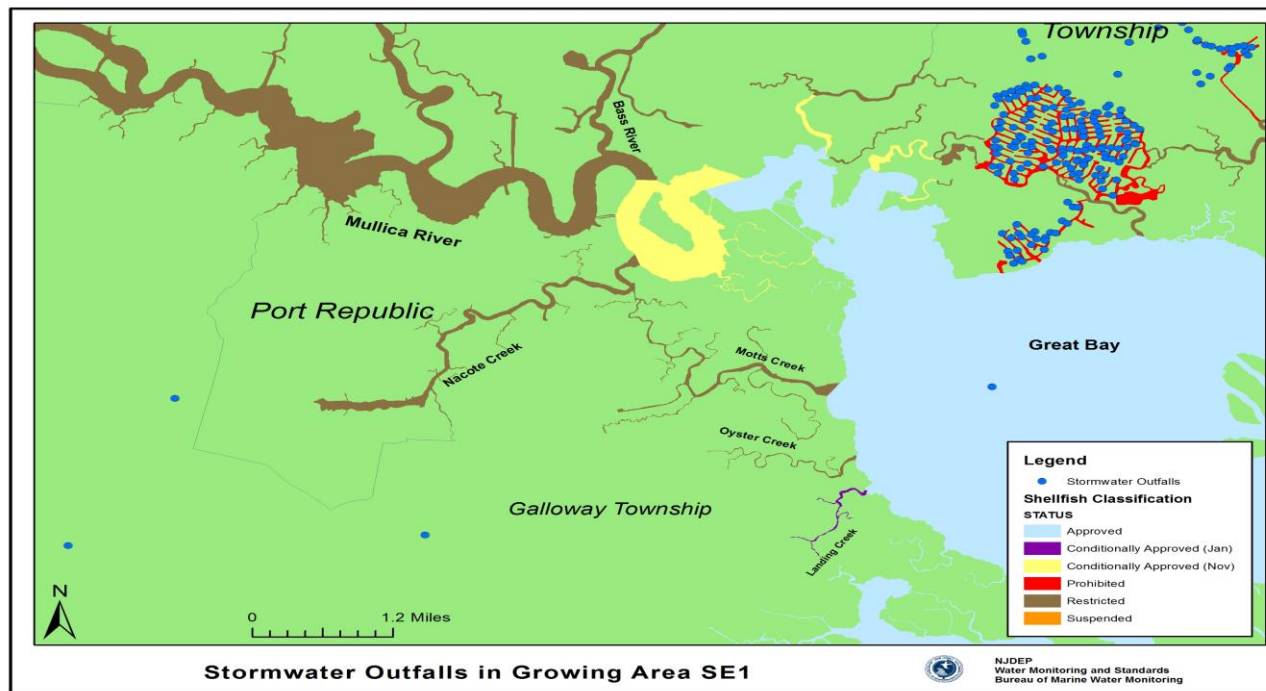
Indirect discharges are groundwater discharge, malfunctioning sewage pump stations, malfunctioning septic systems, known contaminated sites, spills, dredging projects and impacts from wildlife areas. Under normal circumstances, these indirect discharges do not routinely affect water quality. However, on occasion they do result in the closure of shellfish waters due to accidental discharge.

There are many septic systems and sewage pump stations located in this growing area that have the potential to affect water quality if they aren't functioning properly. However, throughout the time frame of this report, there were no issues reported with any of these systems. Please see Appendix B for a complete list of septic systems and Appendix C for a list of pump station locations in this area. Between 2013 and 2017 there were no closures due to indirect and/or unpermitted discharges.

Stormwater Discharges

Non-point source pressures on shellfish beds in New Jersey originate in materials that enter the water via stormwater. Stormwater runoff is generated when precipitation from rain and snowmelt flows over land or impervious surfaces and does not percolate into the ground. As the runoff flows over the land or impervious surfaces (paved streets, parking lots and building rooftops), it accumulates debris, chemicals, sediment or other pollutants that could adversely affect water quality if the runoff is discharged untreated. The typical pollutants that are associated with stormwater run-off are bacteria, heavy metals, pesticides, herbicides, chlorides, petroleum and nutrients. (NJStormwater.Org)

The stormwater outfalls within this growing area are near residential and urbanized districts and have the potential to impact water quality. The bulk of these outfalls are in



Little Egg Harbor Township (see map). These outfalls usually discharge to nearby creeks and lagoon systems. For this reason, shellfish harvesting is prohibited in all lagoon systems.

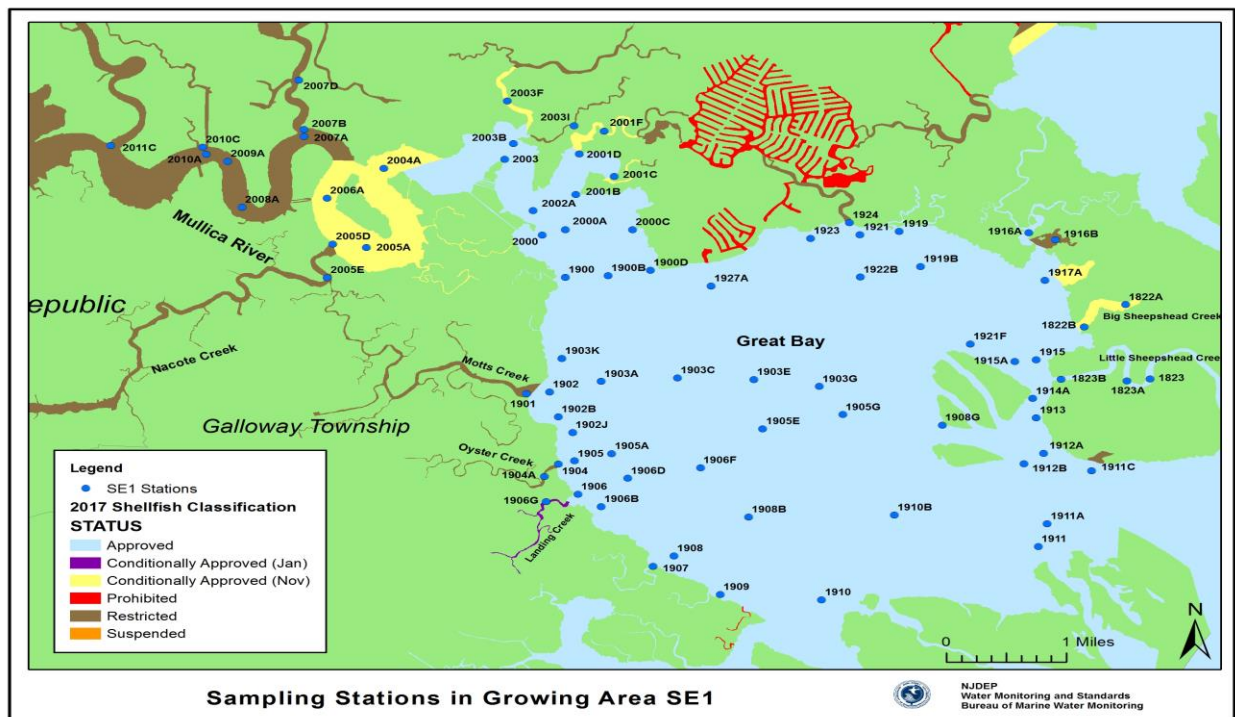
WATER QUALITIES STUDIES

Sampling Strategy

The State shellfish control authority has the option of choosing one of two water monitoring sampling strategies for each growing area, Systematic Random Sampling (SRS) or Adverse Pollution Conditions sampling strategy (APC). For additional information on the types of sampling strategies, see the *Shellfish Growing Area Report Guidance Document, 2011*. This shellfish growing area is not impacted by discharges from sewage treatment facilities or combined sewer overflows; therefore, it was sampled under the Systematic Random Sampling Strategy (SRS).

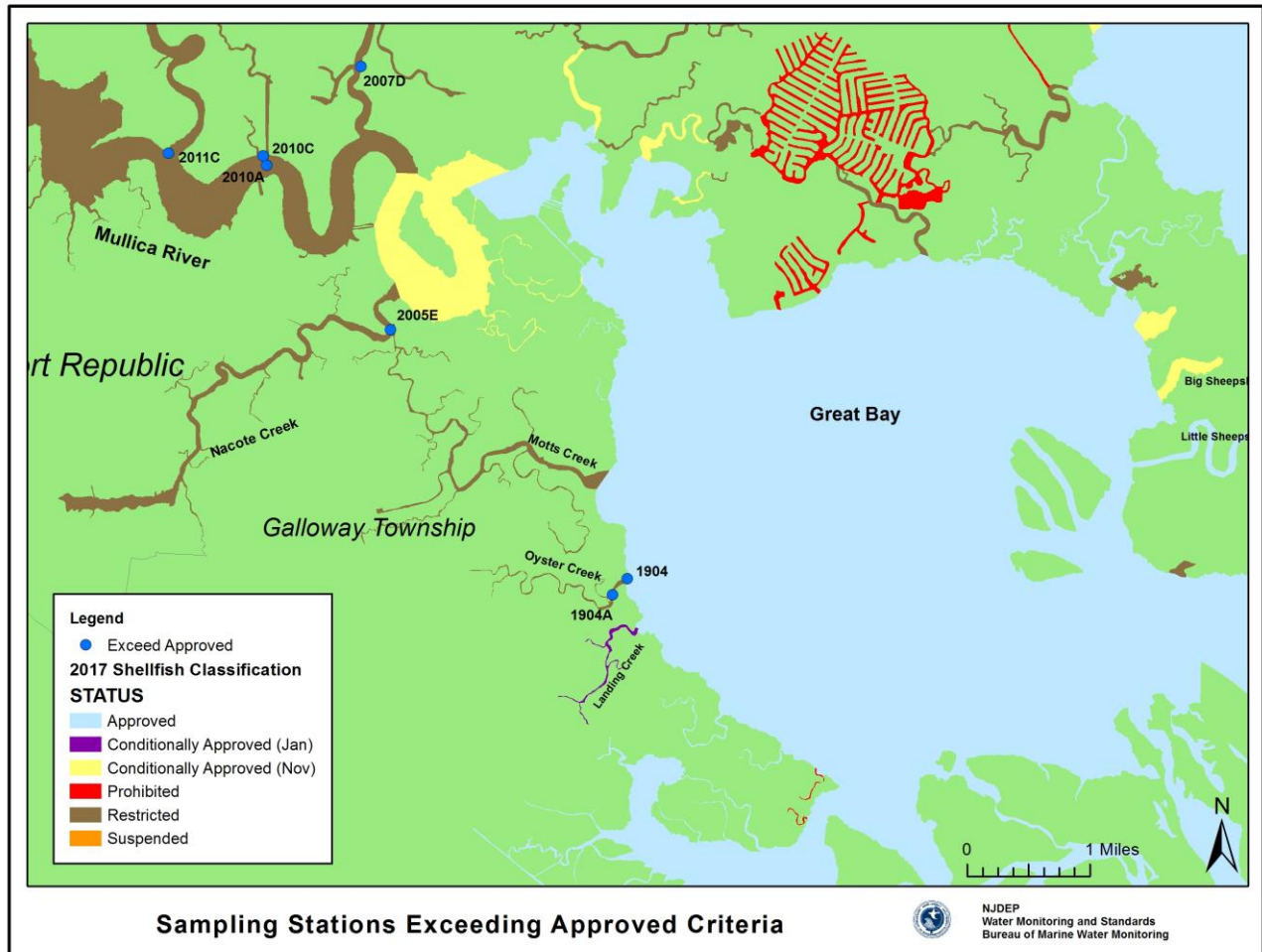
Each shellfish producing state is directed to adopt either the total coliform or fecal coliform criterion to classify its waters. The criteria were developed to ensure that shellfish harvested from designated waters would be free of pathogenic (disease-producing) bacteria. Combinations of these criteria may also be used. In 2013, New Jersey adopted the fecal coliform criterion for classifying shellfish waters. See the *Shellfish Growing Area Report Guidance Document, 2011* for additional information.

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 2005). From October 2013 through August 2017, approximately 2,604 water samples were collected for fecal coliform bacteria from 80 monitoring stations. The locations of these stations are shown in the map below. Data management and analysis was accomplished using database applications developed for the Bureau. Mapping of pollution data was performed with the use of Geographic Information System (GIS: ArcGIS).



BACTERIOLOGICAL QUALITY

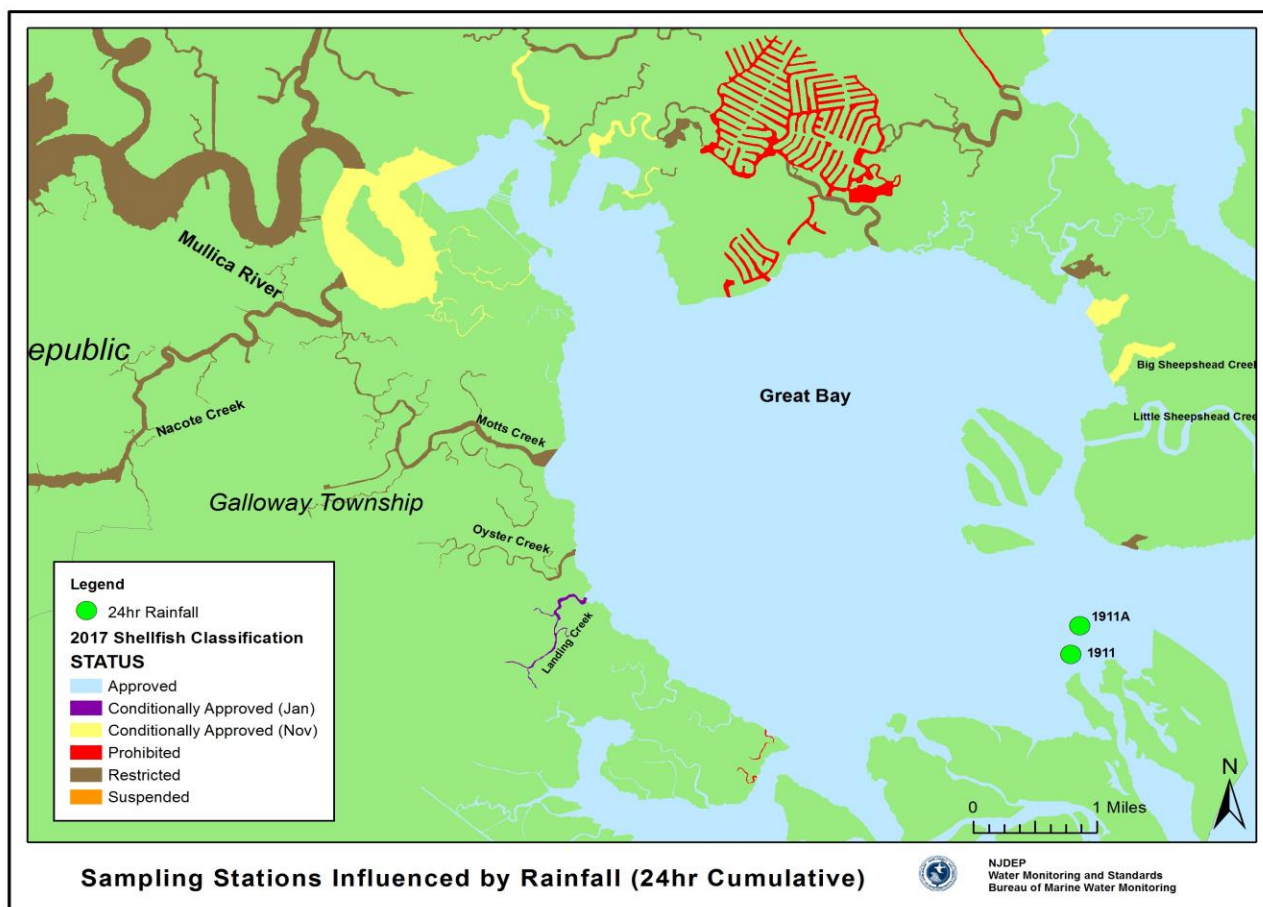
Compliance with NSSP SRS Criteria



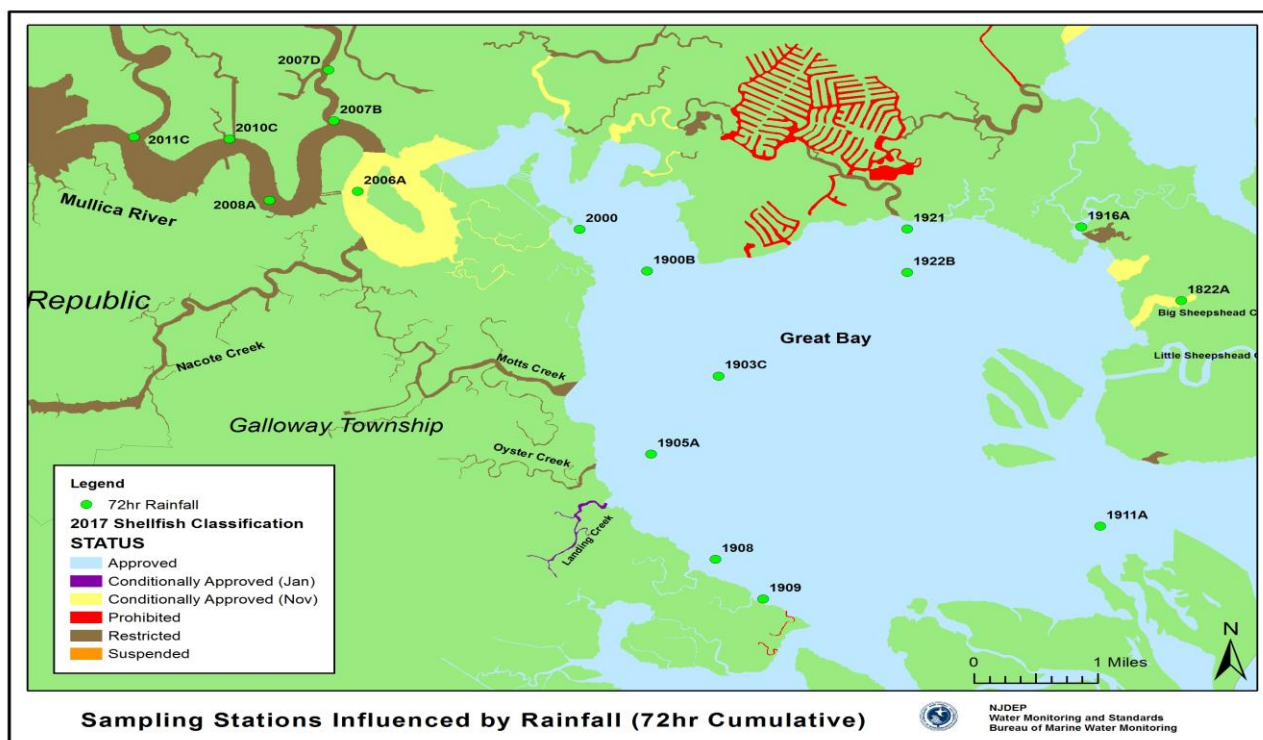
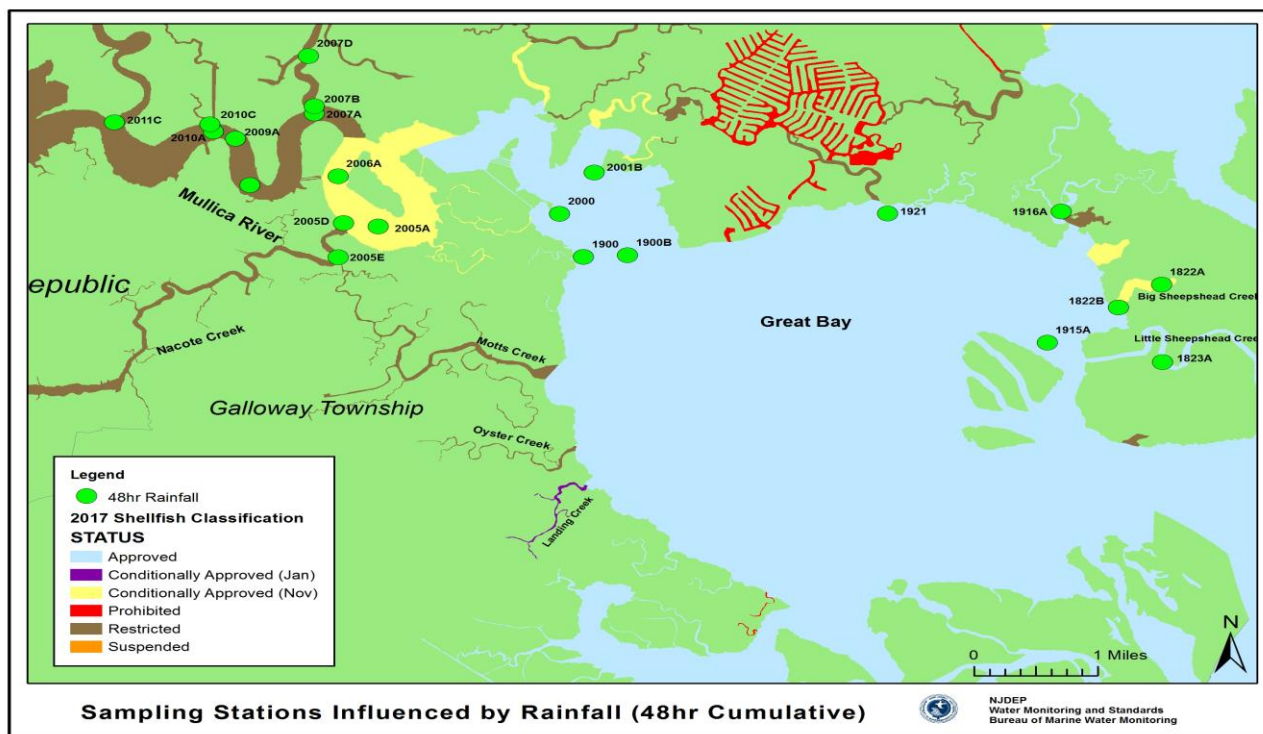
Based on the dataset analyzed for this report, seven monitoring stations within this growing area exceeded SRS *Approved* criteria; however only one of these stations (1904) is located in *Approved* waters. This station has a definite rainfall influence but the raised fecal counts are sporadic. Rainfall impact is mainly due to runoff, carrying contaminants to this site from nearby land masses. The water quality in Great Bay is good due to low bacteria levels found throughout the year. For this reason, shellfish harvesting is permitted year-round in Great Bay. Higher bacteria levels are usually detected in the Mullica River and the adjoining tributaries. There were no noticeable changes in shoreline, hydrography or land use that would require modification to the existing shellfish classifications. Since the elevated bacteria counts at this station occur so seldom and likely don't remain elevated for extended periods, no downgrade of waters is recommended at this time.

Rainfall Effects

The meteorological monitoring provides valuable contextual data for interpreting water quality implications of short-term weather events and for investigating estuarine responses to longer-term climatic variability (NERRS, 2008). Rainfall amounts are based on the closest established NOAA/National Weather Service station; each assignment run is assigned to a weather station to accurately reflect the rainfall at the sampling stations. Precipitation assessment for this shellfish growing area was based on rainfall data collected at Station RA022. This rainfall station was selected to help determine whether run-off would affect the shellfish waters within this growing area.



There is a very small influence with rainfall 24 hours prior to sampling. This is likely due to the wetlands in the area delaying the contaminants from getting to the waterbody.

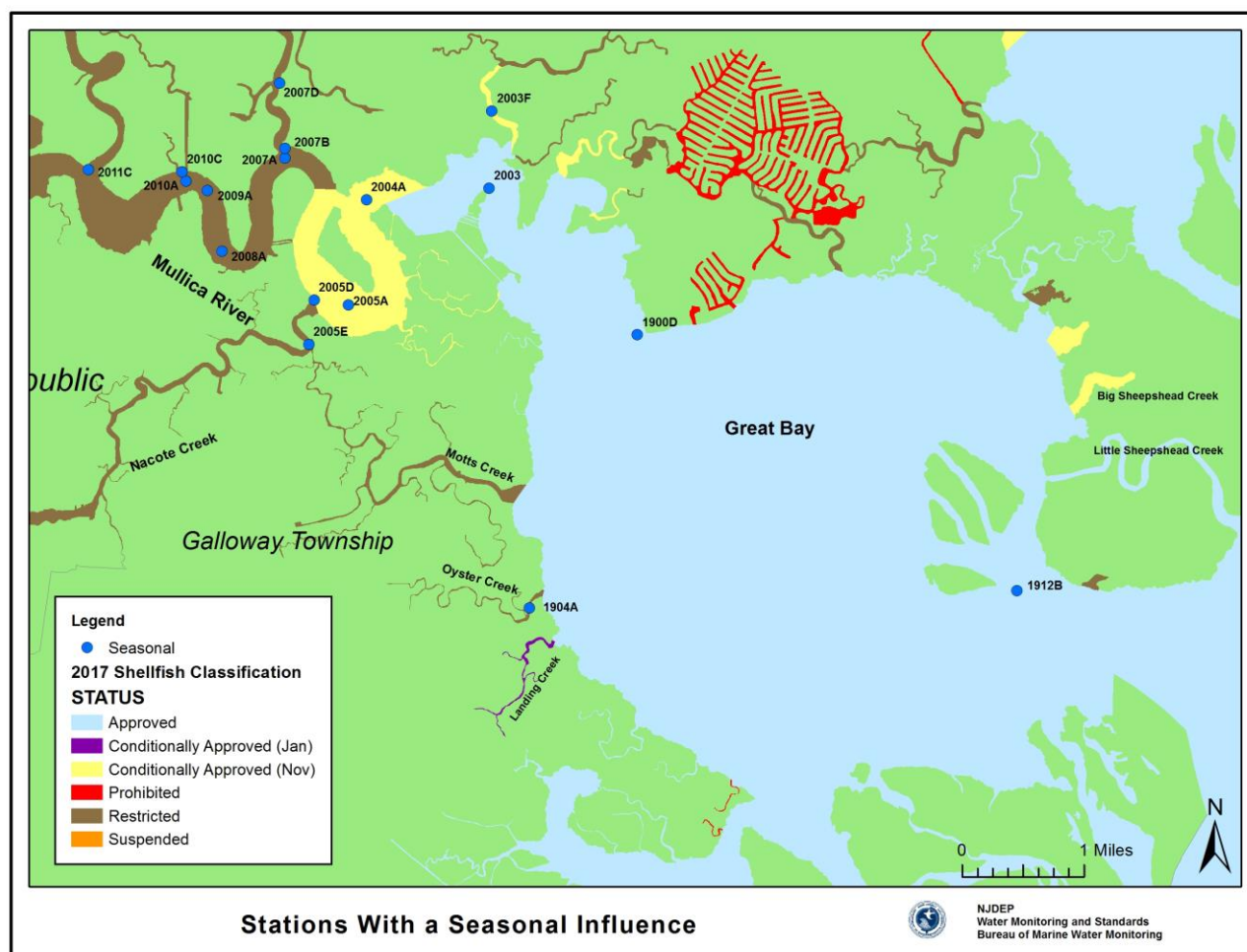


This growing area has the greatest influence from rainfall 48 to 72 hours prior to sampling. The delayed effect of the rainfall is likely due to the fact that this growing area is surrounded by marshes and it takes longer for the contaminants to filter through.

Seasonal Effects

Temperature, precipitation, wind and the general circulation of the atmosphere have seasonal variations that also affect the marine environment (Ingmanson and Wallace, 1989). Seasonal variation may also be the result of a variety of conditions, including specific agricultural land-use practices, biological activity, stream flow and/or sediment.

To determine whether seasonal variation can influence bacteria counts, WM&S/BMWM uses a t-test to compare the fecal coliform values from samples collected during the summer season versus samples collected during the winter season.



Based on the t-test results, seventeen monitoring stations have a t-statistical probability of less than 0.05. Most of the impacted stations are situated in the Mullica River (see map). All but one of the impacted stations has a higher geometric mean during summer, which indicates that they are most likely impacted by summer related activities.

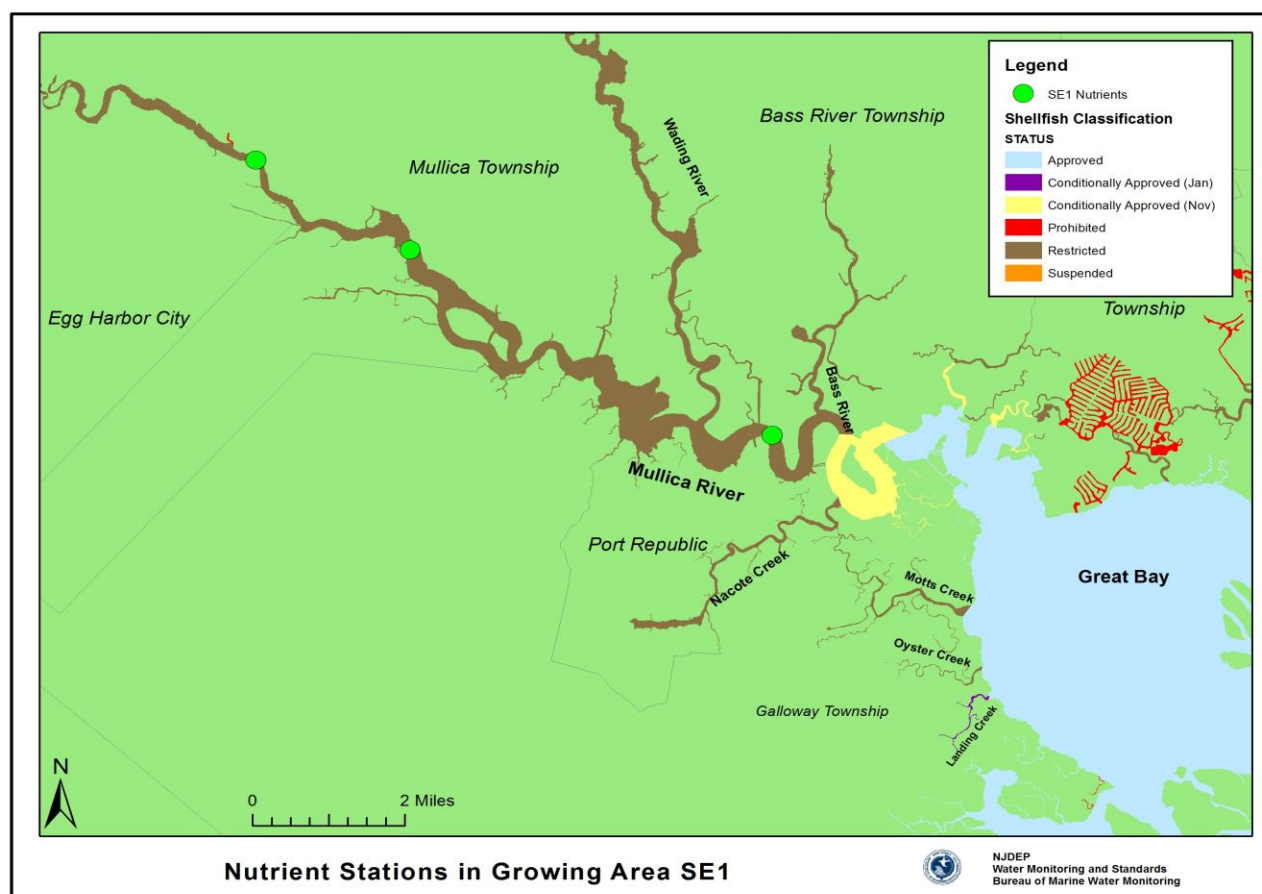
Related Studies

Nutrients

WM&S/BMWM performs additional water quality studies related to the bacteriological monitoring program. Nutrient monitoring and the collection of nutrient data as part of the NJ Coastal Monitoring Network is an example of one of those studies.

Nutrient stations are sampled monthly on a biennial basis. The 90 nutrient stations are spread throughout the State's back bay waters and tidally impacted rivers. At these nutrient monitoring sites, various parameters are measured including water temperature, biogenic silica, chlorophyll a, pH, salinity, secchi depth, total suspended solids, dissolved oxygen, ammonia, nitrate and nitrite, orthophosphate, total nitrogen and total phosphorus. WM&S/BMWM compiles the results of nutrient levels from such stations and then prepares a separate report. For full nutrient assessment, see the Estuarine Monitoring Reports, available at: <http://www.state.nj.us/dep/bmw/>.

Three nutrient monitoring sites sampled under the estuarine monitoring program are located within this shellfish area. Between 2013 and 2017, water samples were collected and analyzed for various parameters (listed above). The map below displays the location of the nutrient monitoring sites.



National Coastal Condition Assessment

The National Coastal Condition Assessment (NCCA) is a statistical survey of the condition of our Nation's marine and Great Lakes coasts. The goals of the NCCA are to address questions about the quality of the Nation's coastal waters. The first NCCA sampling field study was conducted in 2010. The most recent field study was conducted in 2015. Data collected includes benthic macroinvertebrates, chlorophyll a, ecological fish tissue contaminants, dissolved oxygen, nitrogen, phosphorus, salinity, sediment contaminants, sediment toxicity and water clarity. The most recent NCCA data for this area were collected in 2010. A total of 238 NCCA sites were sampled to assess approximately 10,700 square miles of Northeast Coast waters (epa.gov). For additional NCCA data or program information, visit <https://www.epa.gov/national-aquatic-resource-surveys/ncca>.

CONCLUSIONS

The following conclusions were based on the water quality data collected from October 2013 and August 2017. Based on the bacteriological data, one monitoring station (1904) within this growing area does not meet its current *Approved* shellfish classification. At this station, there is a definite rainfall influence. The overall water quality for this growing area remains consistently good. There were no noticeable changes in shoreline, hydrography or land use that would require modification to the existing shellfish classifications. Since the elevated bacteria counts occur so seldom and likely don't remain elevated for extended periods, no downgrade of waters is recommended at this time.

RECOMMENDATIONS

There are no recommended changes in classification or monitoring schedule for this growing area. It is recommended to monitor station 1904 closely by doing extra sampling and intensive shoreline survey. Doing so may explain the sporadic elevated coliform results at this station. Otherwise, continue NSSP sampling protocol as is.

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SUPPORTING DOCUMENTATION

Data Sheets – Sanitary Survey Report for Shellfish Growing Area SE1 (Great Bay-Mullica River), see the Shellfish Growing Area Reports section at www.state.nj.us/dep/wms/bmw.

Shoreline survey field notes and pictures - Sanitary Survey Report for Shellfish Growing Area SE1 (Great Bay-Mullica River), see the Shellfish Growing Area Reports section at www.state.nj.us/dep/wms/bmw.

APPENDICES

A. Data Listing – October 2013 through August 2017

1. Seasonal Evaluation
2. Wet/Dry Statistics
3. Rainfall Amount

B. Shoreline and Septic Survey Sheets, Potential Contamination Sites

C. Pump Station Locations